



Publication number : **0 502 746 A1**

**EUROPEAN PATENT APPLICATION**

Application number : **92301940.0**

Int. Cl.<sup>5</sup> : **B21K 1/56**

Date of filing : **06.03.92**

Priority : **06.03.91 GB 9104706**

Date of publication of application :  
**09.09.92 Bulletin 92/37**

Designated Contracting States :  
**DE FR GB IT**

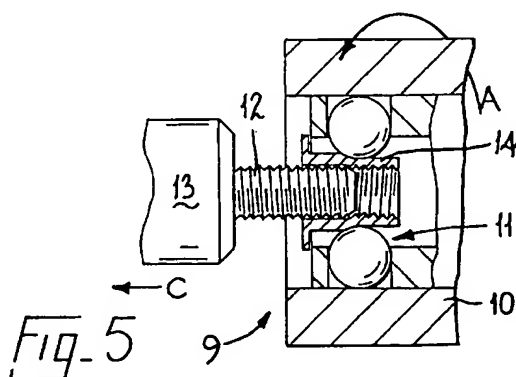
Applicant : **EMHART INC.**  
**Drummond Plaza Office Park, 1423, Kirkwood**  
**Highway**  
**Newark, Delaware 19711 (US)**

Inventor : **Richardson, Stephen Graeme**  
**36 Leigh Road**  
**Walsall, West Midlands WS4 2DS (GB)**  
Inventor : **Osborne, Michael Lionel**  
**43 Stonehouse Road**  
**Sutton Coldfield, West Midlands B73 6LP (GB)**  
Inventor : **Morris, Stephen John**  
**27 Dunbar Grove**  
**Great Barr, Birmingham B43 7PT (GB)**

Representative : **Randall, John Walter et al**  
**Emhart Patents Department, Lyn House, 39**  
**The Parade**  
**Oadby, Leicester LE2 5BB (GB)**

**Production of rivet-nuts.**

Production of rivet nuts by crimping a tubular rivet body (14) on to a threaded mandrel (12) by means of forces applied laterally to the axis of the mandrel (12) inserted into the rivet body (14) wherein the radial pressure-applying means (9,10,11) is rotated as the mandrel (12) and rivet body (14) is inserted therein so that the newly-formed rivet nut is caused to unscrew partly from the mandrel (12) during the thread-forming operation. Greatly enhanced production rates are thereby achieved.



EP 0 502 746 A1

The present invention relates to the production of rivet-nuts, particularly using a technique of swaging on to a mandrel.

It has been proposed to make rivet-nuts by a modification of a process used to manufacture blind rivets by crimping a tubular rivet body on to a mandrel by means of forces applied laterally to the axis of the mandrel inserted into the rivet body. By using a threaded mandrel, the rivet body can be removed by unscrewing to form a rivet nut.

The rivet-nut is formed from a tubular body of uniform wall thickness, the nut being provided with an internal thread on one end portion of the body by the application of force applied in a radial direction towards the axis of the body so that material of the body wall is pressed into the thread of the inserted mandrel to form thread segments and the thus-produced rivet nut unscrewed from the mandrel. Such a process is described in UK patent specification 1 439 811.

Whilst the rivet nut so produced is a perfectly acceptable product, the unscrewing operation is very slow and the productivity rate of the process is very low.

It is an object of the present invention to provide a method of making a rivet-nut by forming an internal threaded portion of the rivet body by application of radial force which has an enhanced productivity rate.

According to the present invention a process for the manufacture of a rivet nut by the insertion of a threaded mandrel into a tubular rivet body, the application of radial pressure to cause the material of an end portion of the tubular body to flow into the thread of the mandrel and unscrewing the thus-formed rivet-nut is characterised in that, as the tubular body and threaded mandrel are inserted by a forward stroke of a forming operation into radial pressure applying means, the radial pressure applying means is rotated as the pressure is applied so that the newly-formed rivet-nut is caused to unscrew from the mandrel at least partly during the thread-forming operation. Preferably, half of the formed thread is unscrewed during the forward stroke. The partial unscrewing of the rivet-nut in the forward, forming stroke of the swaging operation substantially improves the rate of operation of the rivet-nut manufacturing process.

The radial pressure applying means preferably comprises a ring of balls acting as a die to force the rivet body over the threaded mandrel during the forward stroke of a forming operation. A rivet-nut formed by the process of the present invention is barely distinguishable from one formed in accordance with UK patent specification 1 439 811. It is, however, just possible to observe that the rotation of the pressure-applying means during thread formation produces a slight curvature of the thread segments formed in the rivet nut.

A preferred embodiment of the invention will be

described in greater detail by way of example with reference to the accompanying drawings in which:

Figures 1-6 are schematic representations of a rivet nut producing apparatus illustrating the sequential operation of the process of the invention.

In the drawings, (Figs 1-6) a rotating die 9 comprising a carrier having an outer sleeve 10 carrying a ring of balls 11 is rotated in the sense indicated by arrow A. A threaded mandrel 12 carried by chuck 13 is picked up and is inserted through a tubular rivet body 14 (Fig.2) and is advanced in the direction indicated by arrow B until the rivet body 14 enters the rotating ring of balls 11 (Fig.3) which are operated to apply radial pressure to the rivet body 14.

As the tubular rivet body 14 is engaged by the radially-pressing balls 11 threads are formed on the inner surface of the rivet body 14 by the pressure exerted by the ring of balls on the advancing rivet body 14 until the threaded mandrel 12 reaches the limit of its travel and ceases to move towards the rotating die (Fig.4).

The rotation of the die 9 not only forms a thread inside the rivet body 14, but also causes the body to unscrew partially from the threaded mandrel 12. The threaded mandrel 12 is then withdrawn in the direction of arrow C as the die 9 continues to rotate in the direction of arrow A so that the unscrewing of rivet body 14 from threaded mandrel 12 continues to completion so that the rivet body released from the thread mandrel 12 can be ejected from the rotating die 9.

Because of the partial unscrewing of the rivet body from the threaded mandrel during thread formation, the process of the present invention is much quicker than the known process which requires the threaded rivet body to be fully unscrewed from the threaded mandrel after thread formation is completed. Whereas the hitherto known process provides production rates of 10-15 items per minute, with the method of the present invention, production rates of more than 100 items per minute can easily be achieved.

## Claims

1. A process for the manufacture of a rivet nut by the insertion of a threaded mandrel into a tubular rivet body, the application of radial pressure to cause the material of an end portion of the tubular body to flow into the thread of the mandrel and unscrewing the thus-formed rivet-nut characterised in that, as the tubular body and threaded mandrel are inserted by a forward stroke of a forming operation into radial pressure applying means, the radial pressure applying means is rotated as the pressure is applied so that the newly-formed rivet-nut is caused to unscrew from the mandrel at least partly during the thread-form-

ing operation.

2. A process according to claim 1, wherein at least half of the formed thread is unscrewed during the forward stroke. 5
3. A process according to claim 1 or 2, wherein the radial pressure applying means comprises a ring of balls acting as a die to force the tubular body over the threaded mandrel during the forward stroke of a forming operation. 10

15

20

25

30

35

40

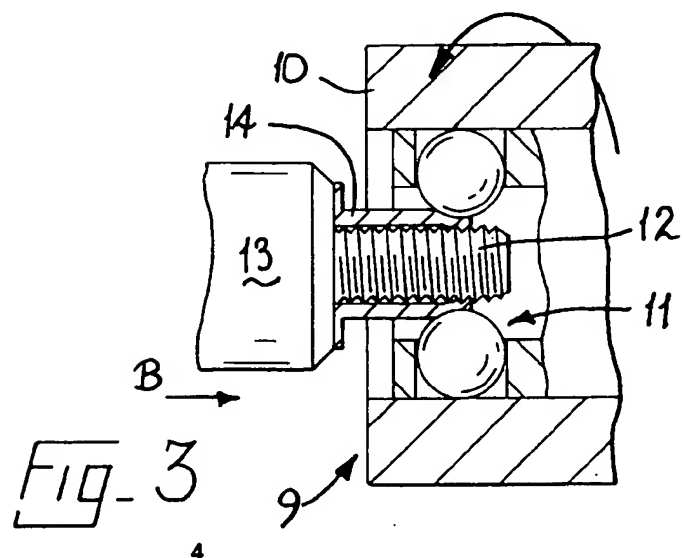
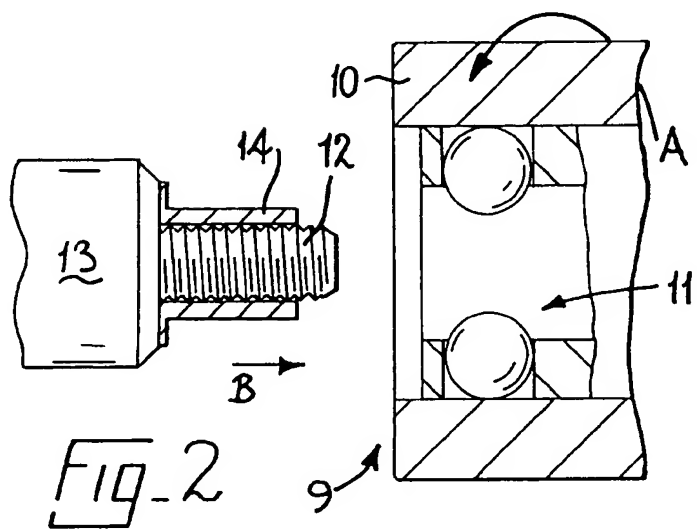
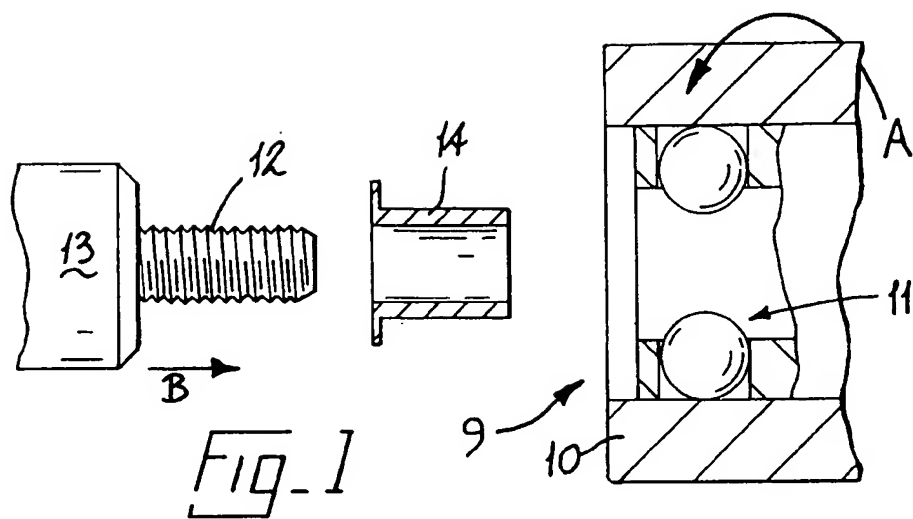
45

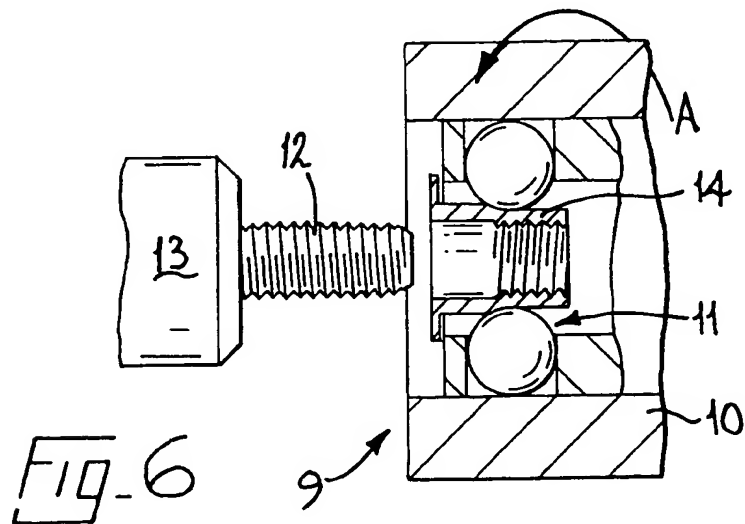
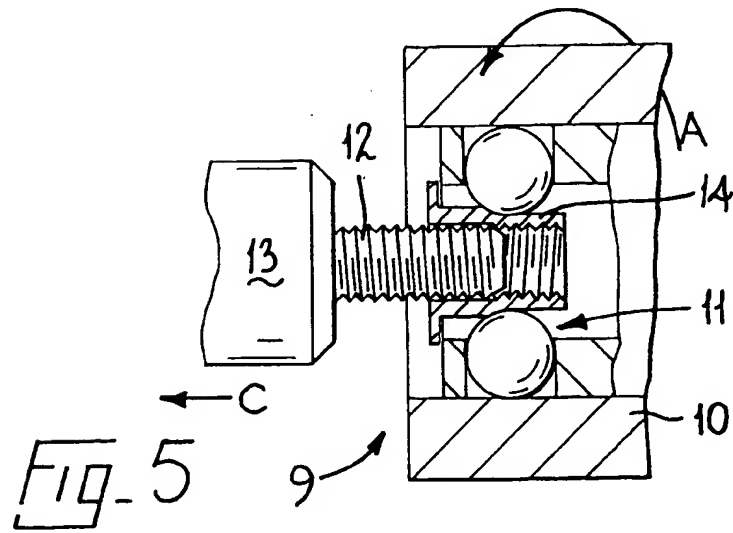
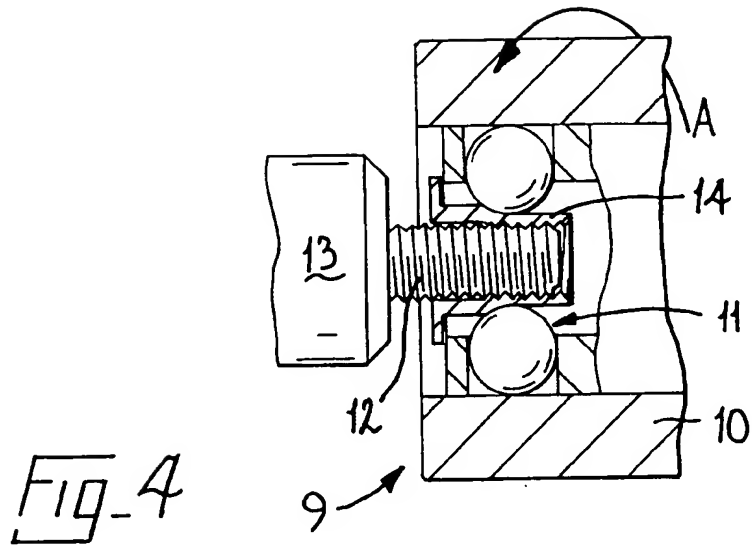
50

55

3

BEST AVAILABLE COPY







European Patent  
Office

# EUROPEAN SEARCH REPORT

Application Number

EP 92 30 1940

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int. Cl.5)
X	US-A-2 862 215 (W.D. GROSS) * column 4, line 3 - line 15; claim 1; figures 1,2,4,5 *	1	B21K1/56
A	---	2	
X	US-A-2 976 549 (G.C. BURD) * column 5, line 50 - column 7, line 42; figures 1-9 *	1	
A	---	2	
X	US-A-3 089 161 (E.P. SUNDHOLM) * column 2, line 65 - column 3, line 6; figures 1,3,4,5 *	1	
X	NL-A-7 901 892 (ERICO EUROPA B.V.) * page 3, line 11 - page 5, line 15; figures 1-6 *	1	
A	---	2	TECHNICAL FIELDS SEARCHED (Int. Cl.5)  B21K B21H
A	GB-A-1 462 429 (VYSKUMNY USTAV) * figures 1,5 *	3	
A	FR-A-1 187 602 (J. MAHIEUX) * figures 3,4 *	3	
The present search report has been drawn up for all claims			
Place of search THE HAGUE		Date of completion of the search 13 MAY 1992	Examiner THE K.H.
<b>CATEGORY OF CITED DOCUMENTS</b> X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document			

EPO FORM 150 (04.82) (P0401)